

# Photo-electric Amplifier ISG-A133

## 1-channel automatic amplifier

- Amplifier with modulated infrared light
- Range up to 25 m (82 ft)
- Automatic Level Control (ALC) according to assembly distance and direction
- Test function to check installation and signal strength
- Adjustable switching-on and switching-off delay
- Programmable light/dark function
- Four basic transmit levels
- Transmission channel frequency selection by dip switch
- Test input
- Transistor output (npn/pnp)
- Transmitter and receiver connections are short-circuit proof
- 11-pin DIN rail mounting socket for simple installation



### Description

This 1-channel automatic amplifier from Pantron has set a new standard for devices of this type. It is an amplifier with an integrated analysis unit. The automatic gain setting enables the user to simplify the installation and work.

The amplifier can be switched to the different working conditions by DIP-switches. The sensitivity of the device can be switched to 4 basic transmit levels using the same method. Also, the transmitter power can be increased to optimize object recognition.

A contron unit, which can be activated by simply pressing a button, is used to determine malfunctions in the transmitter or the receiver. If nothing is defective, the test function shows the signal quality by flashing an LED from 1 to 10 times. The flashes are proportional to the received signal.

Another feature of the amplifier is the test input which

enables a PLC to check the system by switching the transmitter on and off. This allows the user to verify the transistor output functionality. An alarm display and output, which shows errors and the limit of the transmit power and is connectable with a PLC, enables users to safely work with the photoelectric amplifier.

### Ordering Guide

Model	order no.
ISG-A133/230VAC	8IG 421 331
ISG-A133/115VAC	8IG 421 332
ISG-A133/24VAC	8IG 421 334
ISG-A133/24VDC	8IG 421 336



#### Safety Instructions

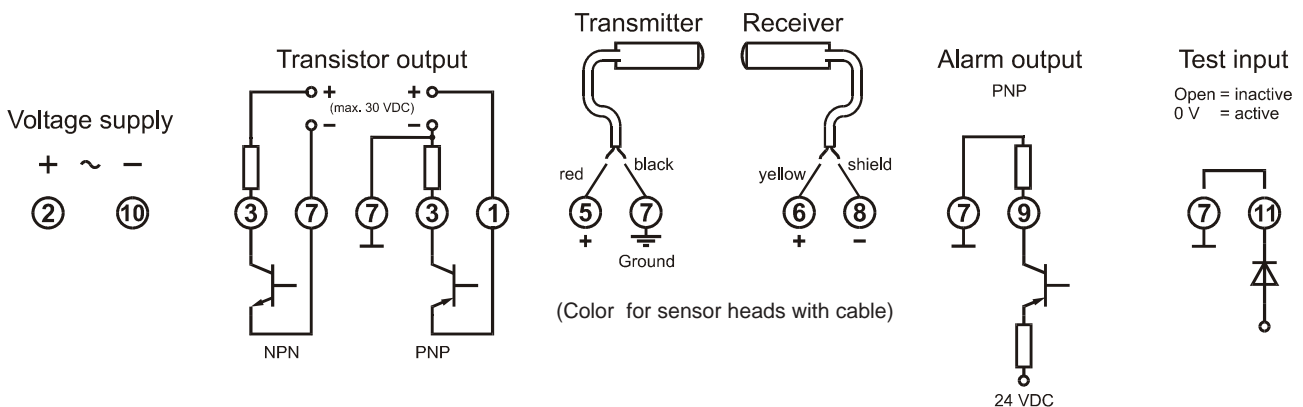
The operation of infrared amplifier ISG... is not authorized for applications where safety of the person depends on the device function.

## Technical Data

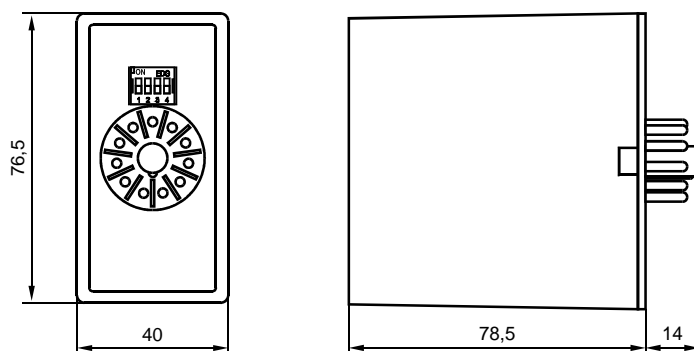
Operating basis	Modulated IR-light
Max. Range (through beam)	
Sensor heads Standard	15 m (49 ft)
Sensor heads High Power	25 m (82 ft)
Displays:	
Switching status	LED yellow
ALC	LED green
Alarm	LED red
Frequency	2 x LED yellow
Basic transmit level	2 x LED green
Switching function	Light / dark, selectable
Switching delay	0 - 10 s
ALC delay	No
Housing	Plastic
Housing protection	IP 40
Temperature (operation)	-25 °C ... +60 °C
Temperature (storage)	-40 °C ... +80 °C

Supply voltage	230 V AC, 115 V AC, 24 V AC, 24 V DC
Voltage tolerance	10 %
Power consumption	AC: 2,4 VA; DC: 2,2W
Transmit frequency	3,7 kHz / 4,1 kHz
Transmit power	Automatic
Basic transmit level	Low 1/Low 2/High 1/High 2
Transistor output:	npn / pnp
Switching data (max.)	100 A / 30 V DC
Reaction time T <sub>ON</sub> / T <sub>OFF</sub>	Low 1: 25 ms / 25 ms High 1: 80 ms / 15 ms
Alarm output:	pnp
AC devices	24 V DC / max. 5 mA
DC devices	24 V DC / max. 100 mA
Test input	0 V ... +30 V DC
Mounting orientation	Free
Mounting	11-pin DIN-socket
Size (mm)	38,5 x 75,5 x 78,5

## Wiring diagram



## Dimensions



Dimensions in mm

## General Description

### 1. Principle of operation

The system (consisting of one transmitter, one receiver and one amplifier) works with modulated infrared light. According to the channel condition, the appropriate transmit power is calculated (Automatic Level Control) and the display and outputs are set.

### 2. Automatic Level Control

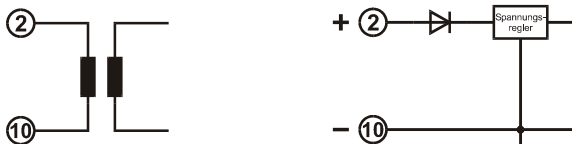
Automatic Level Control is the main feature of Pantron's infrared automatic amplifier. The transmitter power level is continuously calculated to an optimal value to guarantee steady switching reaction, independent from the distance between transmitter and receiver, mounting position, temperature etc.

### 3. Connections

The amplifier is connected with an 11-pin DIN mounting socket.

#### a) Power Supply (POWER)<sup>1</sup>

Before connecting the amplifier, look on the bottom and check if the power supply is the same as the connection value. The power supply will be connected on PIN 2 and PIN 10. For devices with direct current, PIN 2 is positive and PIN 10 is neutral (see picture 1).



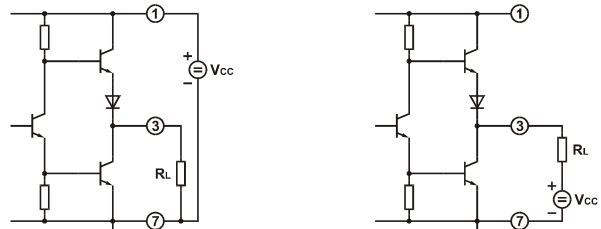
picture 1: left: AC-Connection; right: DC-Connection

#### CAUTION!

The AC-supply devices are isolated from main. A grounded connection on the low voltage side is required (PIN 7).

#### b) Transistor output<sup>1</sup>

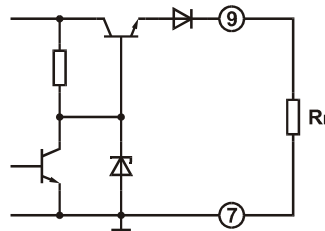
The amplifier has one transistor output (PIN 3) which can be used as pnp or npn output depending on the connection (see picture 2). The maximum allowable switching data is 30 V DC / 100 mA.



picture 2: left: pnp-output; right: npn-output

#### c) Alarm output (ALARM)<sup>1</sup>

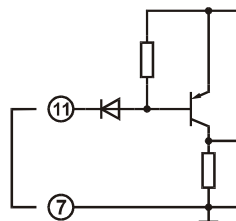
The Alarm output has 24 V DC output voltage and a maximum current value from 5 mA (AC-Devices) and 100 mA (DC-Devices). To evaluate the signal connect the evaluation unit between the positive (PIN 9) and the neutral (PIN 7), see picture 3.



picture 3: Alarm output

#### d) Test input (TEST-INPUT)<sup>1</sup>

The test input enables you to check the system by switching the transmitter off and on. To activate the test input, connect PIN 11 to PIN 7 (ground), see picture 4.



picture 4: Test input

Note: The voltage on PIN 11 should not be higher than +30 V DC or lower than -12 V DC. If the voltage is lower than +3 V DC, the input is active.

## 4. Operation Modes Terminology

The ISG-A133 has 2 basic operation modes:

### a) Normal operating mode

This is the standard operating mode of the amplifier that is always active at power-up and after pressing the reset button (2 seconds)

### b) Test mode

This is used for the physical alignment of the sensor heads and to test the wiring. The amplifier displays the following information:

- Signal strength
- Error sensor heads

The relay output switching is interrupted in this mode. The outputs (relay and alarm) maintain the state they are in.

## 5. Functions terminology

With the functions the amplifier can be switched to different working conditions. The functions are selected by DIP-switches on the bottom of the amplifier.

### a) Basic transmit level (transmit power)<sup>1 2</sup>

The basic transmit level is the minimum transmit power level of an infrared transmitter.

Low 1: This is the standard operating mode of the Automatic Level Control (ALC). The transmit power level is always set to the optimal value for constant high switching sensitivity.

Low 2: The amplifier works like the Low 1 basic transmit level but the device is less sensitive.

High 1: The transmit power level is always at least 50 % of the maximum power level.

High 2: The transmit power level is always at least 90 % of the maximum power level.

### b) Switching mode<sup>1</sup>

The switching function describes the output behavior on interruption of the infrared beam. There are two types of switching functions:

Light mode operation: the output switch to ground (PIN 3 → PIN 7).

Dark mode operation: the output switch to the positive pole (PIN 1 → PIN 3).

### c) Transmit frequency (transmit freq.)<sup>1</sup>

The transmit frequency means the modulation frequency at which the amplifier works. If more than one sensor head is mounted side by side, the amplifier must be set to different frequencies. Each amplifier reacts only with its own transmit frequency and place.

### d) Switching-on delay (t-ON)<sup>2</sup>

Switching-on delay is the time between the presence (light mode operation) or the absence (dark mode operation) of the infrared beam and turning the output on.

### e) Switching-off delay (t-OFF)<sup>2</sup>

Switching-off delay is the time between the absence (light mode operation) or the presence (dark mode operation) of the infrared beam and turning the output off.

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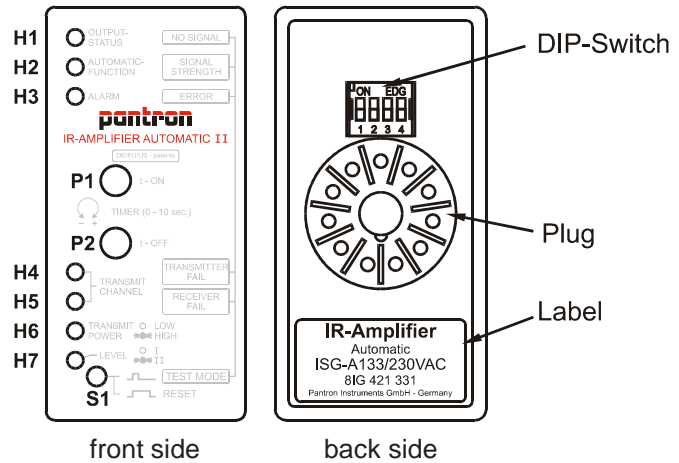
<sup>1</sup> Inscription side label

<sup>2</sup> Inscription front label

## Operating Instructions

Display contents:

- H1: Output status indicator / no signal (yellow)
- H2: ALC display / signal strength (green)
- H3: Alarm display / error (red)
- H4 and H5: Transmit frequency display / transmitter or receiver fail (yellow)
- H6 and H7: Basic transmit level display (green)
- P1: Switching-on delay
- P2: Switching-off delay
- S1: Test / reset button



### 1. Choose the sensor heads

Before you turn on the amplifier, select the transmitter and receiver for your application. This includes choosing the sensor heads body style and cable length or quick disconnect that meets your requirements.

### 2. Connect wiring to the socket

The amplifier is designed for simple installation. An 11-pin socket must be used for installation. The wiring diagram is printed on the side label from the amplifier or see **Wiring diagram**. For more information see **General Description** point 3 **Connections**.

### 3. Choose the function

The functions are selectable by DIP-switches on the bottom of the amplifier. For complete description of function, see **General Description** point 5 **Function terminology**. The selection of the functions is described in table 1.









Basic transmit level (transmit power) <sup>1</sup>		switching mode <sup>1</sup>		Transmit frequency (transmit freq.) <sup>1</sup>	
	LED display H6   H7				LED display H4   H5
 Low 1 <sup>1</sup>	⊗ ⊗	 light <sup>1</sup>		 3,7 kHz (f1) <sup>1</sup>	⊗ ⊗
 Low 2 <sup>1</sup>	⊗ ⊗	 dark <sup>1</sup>		 4,1 kHz (f2) <sup>1</sup>	⊗ ⊗
 High 1 <sup>1</sup>	⊗ ⊗				
 High 2 <sup>1</sup>	⊗ ⊗				

Table 1: Functions

#### 4. Check the supply voltage

On the bottom of the amplifier is the type plate. The supply voltage is the last two or three numbers of the part number. Check if this value is the same as the connection value.



supply voltage  
for example: 230 V AC

#### 5. Operating procedure

Plug the amplifier into the socket and switch the power supply on. The device is in the normal operation mode. From the normal operation mode, press S1 to enter the test mode. Pressing S1 for two seconds will cause a reset equivalent to the power-on-reset.

Note: If the LED H3 (ALARM)<sup>2</sup> lights red after switching on the power supply, the contact between transmitter and receiver is interrupted or the distance between the sensor heads is too far.

##### a) Normal operating mode

If the beam is made between the transmitter and receiver the LED H2 (AUTOMATIC-FUNCTION)<sup>2</sup> lights green. The ALC is active and the transmit power will be turned automatically on an optimum level. If the infrared beam is interrupted, the green LED AUTOMATC-FUNCTION<sup>2</sup> is off and the transmit power level will be constant until the infrared beam is clear again. For a description of how the devices work, see table 2







Beam status	Switching mode	Output status indicator	Transistor output
	light		npn: open pnp: pnp+
	dark		npn: 0 V pnp: open
	light		npn: 0 V pnp: open
	dark		npn: open pnp: pnp+

Table 2: Switching logic

After the sensor heads become polluted, the amplifier will raise the transmit power level. At 95 % of the maximum transmit power, the red alarm display H3 (ALARM)<sup>2</sup> lights and the alarm output is active. With the potentiometer P1 and P2 you are be able to set the switching-on and switching-off delay.

When the test input is activated, by switching PIN 11 to ground, the yellow display H1 (OUTPUT STATUS)<sup>2</sup> flashes and the transmitter is off. When the beam between transmitter and receiver is broken, the relay switches. Thereby, the regular function of the amplifier, including the external connection up to the evaluate unit, can be checked.

**b) Test mode**

In the test mode the amplifier checks the sensor heads and the signal quality. To enter the test mode, press the S1 button. The amplifier displays the following information.

- **SIGNAL STRENGTH<sup>2</sup>**

The display SIGNAL STRENGTH<sup>2</sup> flashes between 1 and 10 times. The flashes are proportional to the received signal.

- **ERROR<sup>2</sup>**

If this display flashes red, there must be an error. Another LED describes the mistake exactly.

**H1 flashes - No Signal**

If the display NO SIGNAL<sup>2</sup> flashes repeatedly, the amplifier is receiving no signal. The distance between the sensor heads is too far, they are out of alignment, or an object is between them.

**H4 flashes - Transmitter fail**

If the display TRANSMITTER FAIL<sup>2</sup> flashes repeatedly, there is a problem with the transmitter connection (PIN 5 und PIN 7).

- If the display flashes slowly (like ERROR), the resistance is too high. The transmitter is not connected or the cable is broken.
- If the display flashes fast (faster than ERROR), the resistance is too low. The transmitter has a short circuit.

**H5 flashes - Receiver fail**

If the display RECEIVER FAIL<sup>2</sup> flashes repeatedly, there is a problem with the receiver connection (PIN 6 und PIN 8).

- If the display flashes slowly (like ERROR), the resistance is too high. The receiver is not connected or the cable is broken.
- If the display flashes fast (faster than ERROR), the resistance is too low. The receiver has a short circuit.

After a few seconds the device leaves the test mode and goes back to the normal mode or you can press S1 again.

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<sup>1</sup> Inscription side label

<sup>2</sup> Inscription front label